RATTMMOTOR CNC 1310

RATTMMOTOR CNC Controller Board User Manual

Model: CNC 1310
Brand: RATTMMOTOR

Introduction Safety Overview Specifications Setup Operation Maintenance Troubleshooting Warranty & Support

1. Introduction

This user manual provides detailed instructions for the RATTMMOTOR CNC Controller Board, Model CNC 1310. This 4-axis GRBL controller board is designed for DIY mini CNC wood router and engraving machines, offering robust control and connectivity via USB. Please read this manual thoroughly before installation and operation to ensure proper use and safety.

2. Safety Information

WARNING: Always disconnect power before making any connections or performing maintenance.

- Ensure proper ventilation when operating the CNC machine.
- Use appropriate personal protective equipment (PPE) such as safety glasses.
- Verify all wiring connections are secure and correct before applying power.
- Do not exceed the recommended input voltage (12-24VDC).
- Keep the controller board away from moisture and extreme temperatures.
- Familiarize yourself with emergency stop procedures for your CNC machine.

3. Product Overview and Components

The RATTMMOTOR CNC Controller Board is a versatile control unit for your CNC projects. It features a compact design with integrated stepper motor drivers and various input/output ports.

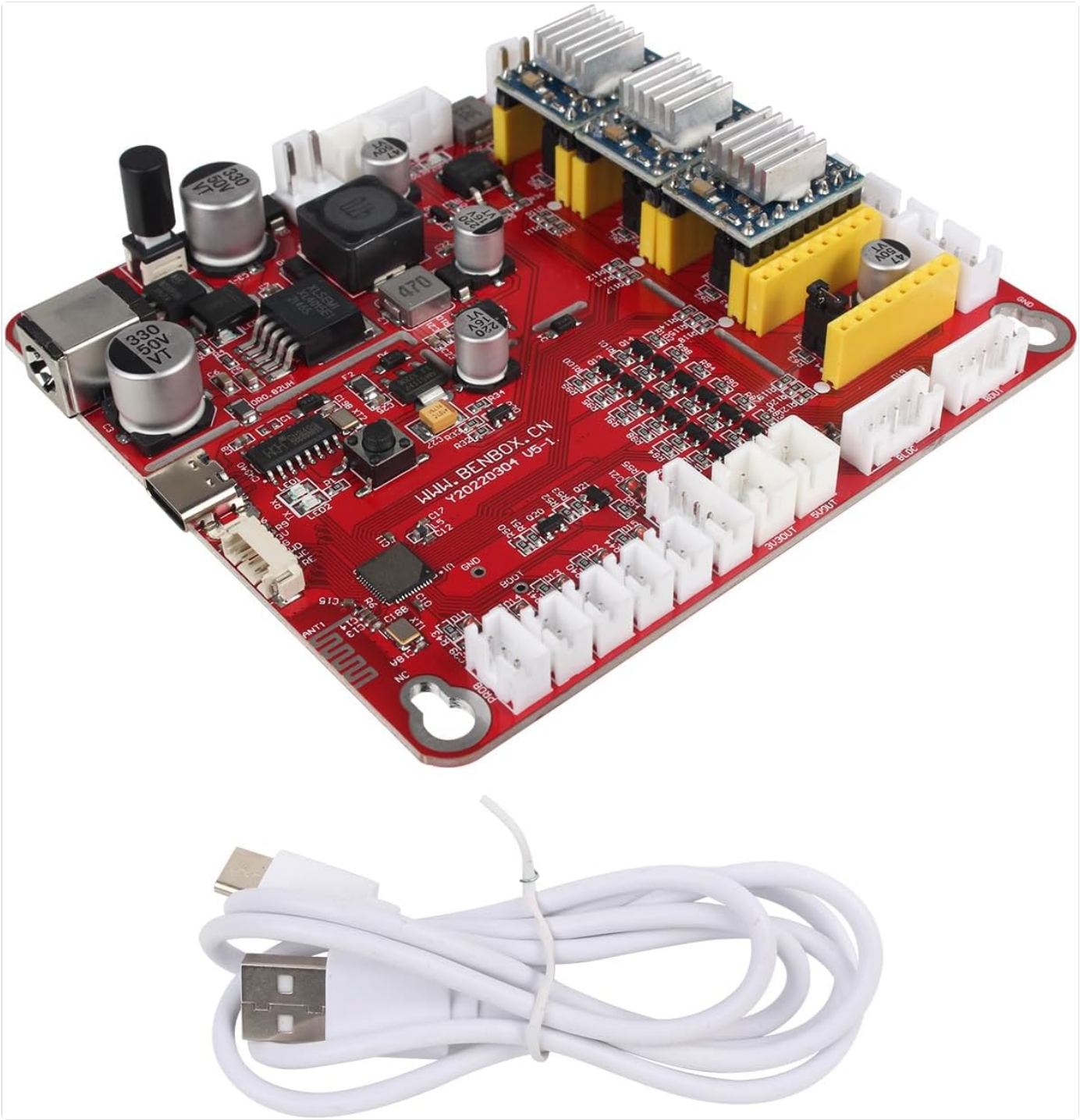


Figure 3.1: The RATTMMOTOR CNC Controller Board (Red) with its accompanying USB cable. This image displays the compact size and the various components on the board, including heat sinks on the stepper drivers.

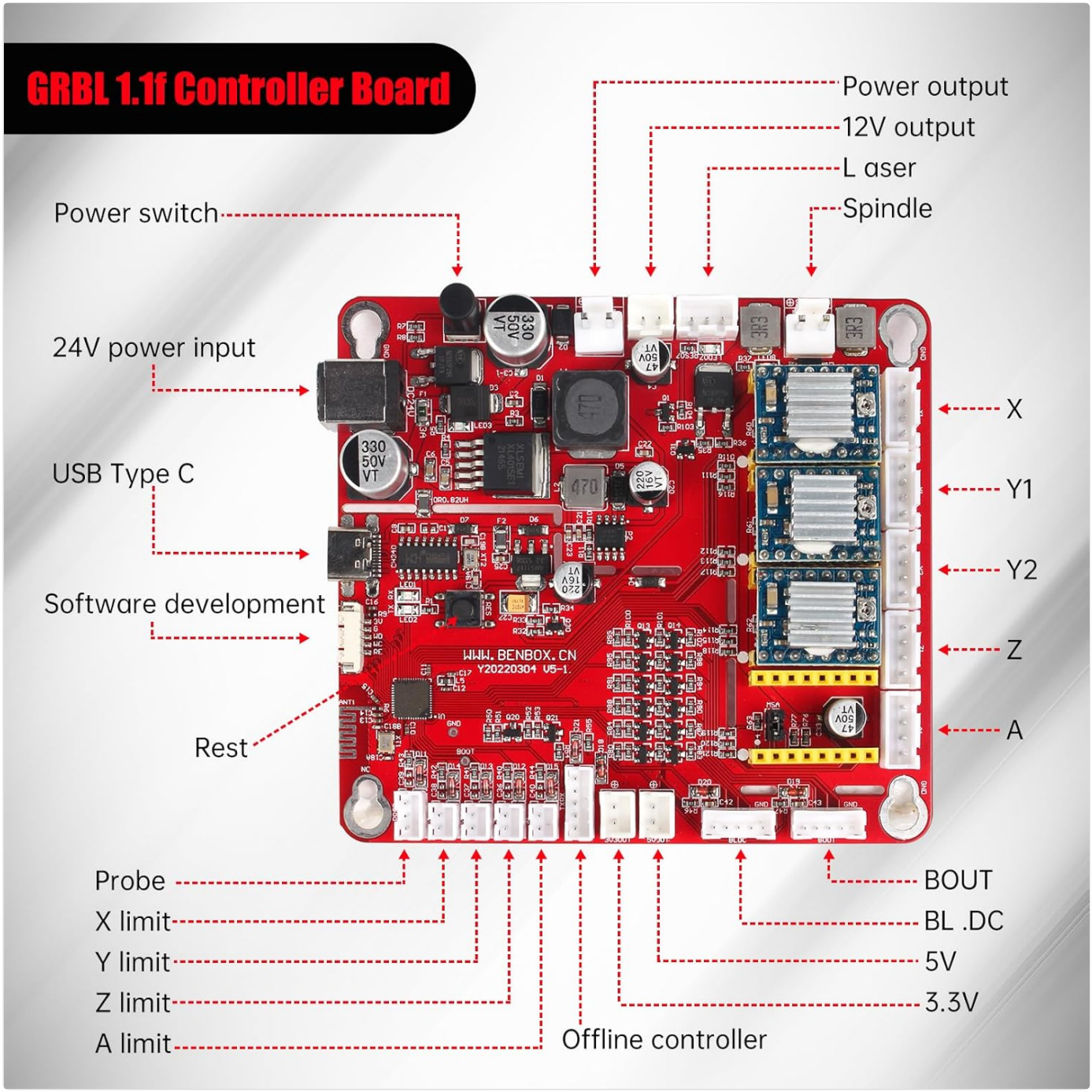


Figure 3.2: Detailed diagram of the GRBL 1.1f Controller Board, highlighting key connection points. These include the 24V power input, USB Type C port, power switch, 12V output, Laser and Spindle outputs, X, Y1, Y2, Z, and A axis motor connections, Probe, X/Y/Z/A limit switch inputs, and connections for an offline controller.

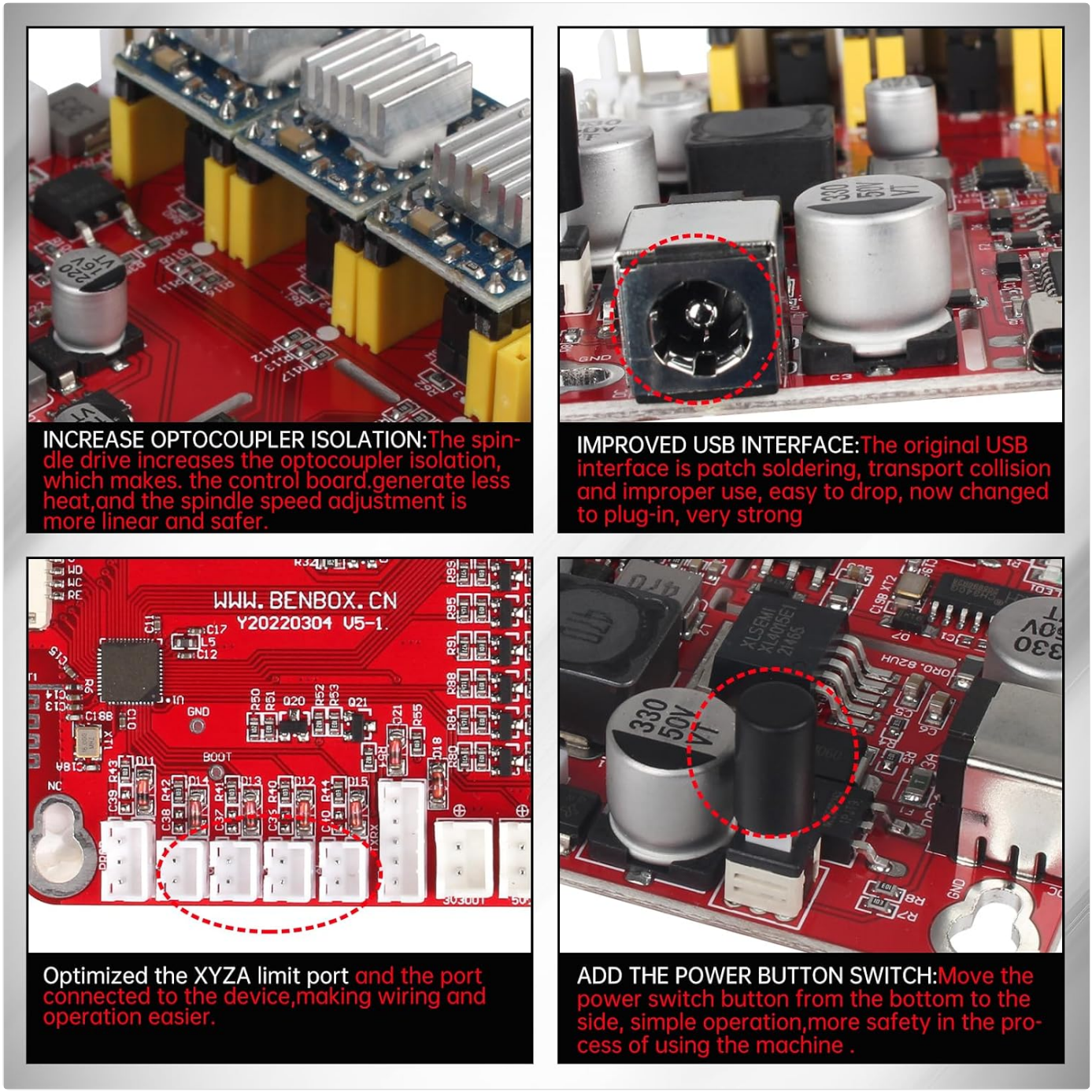


Figure 3.3: Close-up views illustrating enhanced features of the board. This includes increased optocoupler isolation for improved spindle drive safety and reduced heat generation, an improved USB interface for reliable connection, optimized XYZA limit ports for easier wiring, and the addition of a power switch button for convenient operation.

Key Features:

- **4-Axis Control:** Supports X, Y, Z, and A axes for versatile engraving and routing.
- **GRBL Compatibility:** Works with GRBL control software for easy operation.
- **USB Connectivity:** Utilizes a USB-CH340 chip for stable communication with a computer.
- **Wide Voltage Input:** Operates on 12-24VDC (24VDC recommended).
- **Spindle Control:** Supports PWM speed control for spindles up to 20000RPM and 0.5W-20W laser modules.
- **Limit Switch Support:** Dedicated ports for X, Y, Z, and A axis limit switches for enhanced safety.
- **Offline Controller Support:** Allows for operation without a direct computer connection.
- **Integrated Power Switch:** Convenient on/off button for safe operation.

4. Specifications



Figure 4.1: Overview of supported operating systems and a detailed specification table for the RATTMMOTOR CNC Controller Board.

Parameter	Value
Model Number	CNC 1310
Connection	USB (USB-CH340)
Input Voltage	12-24VDC (Recommended: 24VDC)
Power Interface	5.5-2.5mm DC interface
Control Software	GRBL control / Lite.fire
Supported Stepper Motor	12V, max current 2A (recommended < 1.5A with additional heat sinks)
Spindle PWM Speed	Support (Max 20000RPM spindle, 0.5W-20W laser module)

Parameter	Value
Axes Supported	X, Y, Z, A (4-axis engraving)
Limit Switch Function	X/Y/Z/A axis limit switch support
Power Switch Button	Yes
Supported Operating Systems	Windows XP / Win 7 / Win 8 / Win 10 (32/64-bit) / Linux
Item Weight	6.8 ounces
Package Dimensions	7.99 x 4.53 x 3.15 inches
Material	Plastic

5. Setup Guide

5.1. System Requirements

Ensure your computer meets the following minimum requirements:

- Operating System: Windows XP / Win 7 / Win 8 / Win 10 (32/64-bit) or Linux.
- Available USB Port.
- Internet access for software downloads (if not provided).

5.2. Hardware Connections

Refer to Figure 3.2 for a visual guide to the connection points on the board.

1. **Power Supply Connection:** Connect a 12-24VDC power supply (24VDC recommended) to the 5.5-2.5mm DC power interface. Ensure the power supply is off before connecting.
2. **Stepper Motor Connections:** Connect your NEMA17 or NEMA23 stepper motors to the X, Y1, Y2, Z, and A axis ports. Ensure correct wiring polarity for each motor. The board supports 4-axis engraving, allowing for an additional rotational axis (A-axis).
3. **Spindle/Laser Connection:** Connect your spindle motor or laser module to the designated Spindle/Laser output ports. The board supports PWM speed control for spindles and 0.5W-20W laser modules.
4. **Limit Switch Connections:** Connect X, Y, Z, and A axis limit switches to their respective ports. These switches provide safety by stopping movement when the machine reaches its physical limits.
5. **Probe Connection:** If using a probe for tool setting, connect it to the 'Probe' port.
6. **Offline Controller (Optional):** If you have an offline controller, connect it to the 'Offline controller' port for standalone operation.
7. **USB Connection:** Connect the controller board to your computer using the provided USB Type C cable.

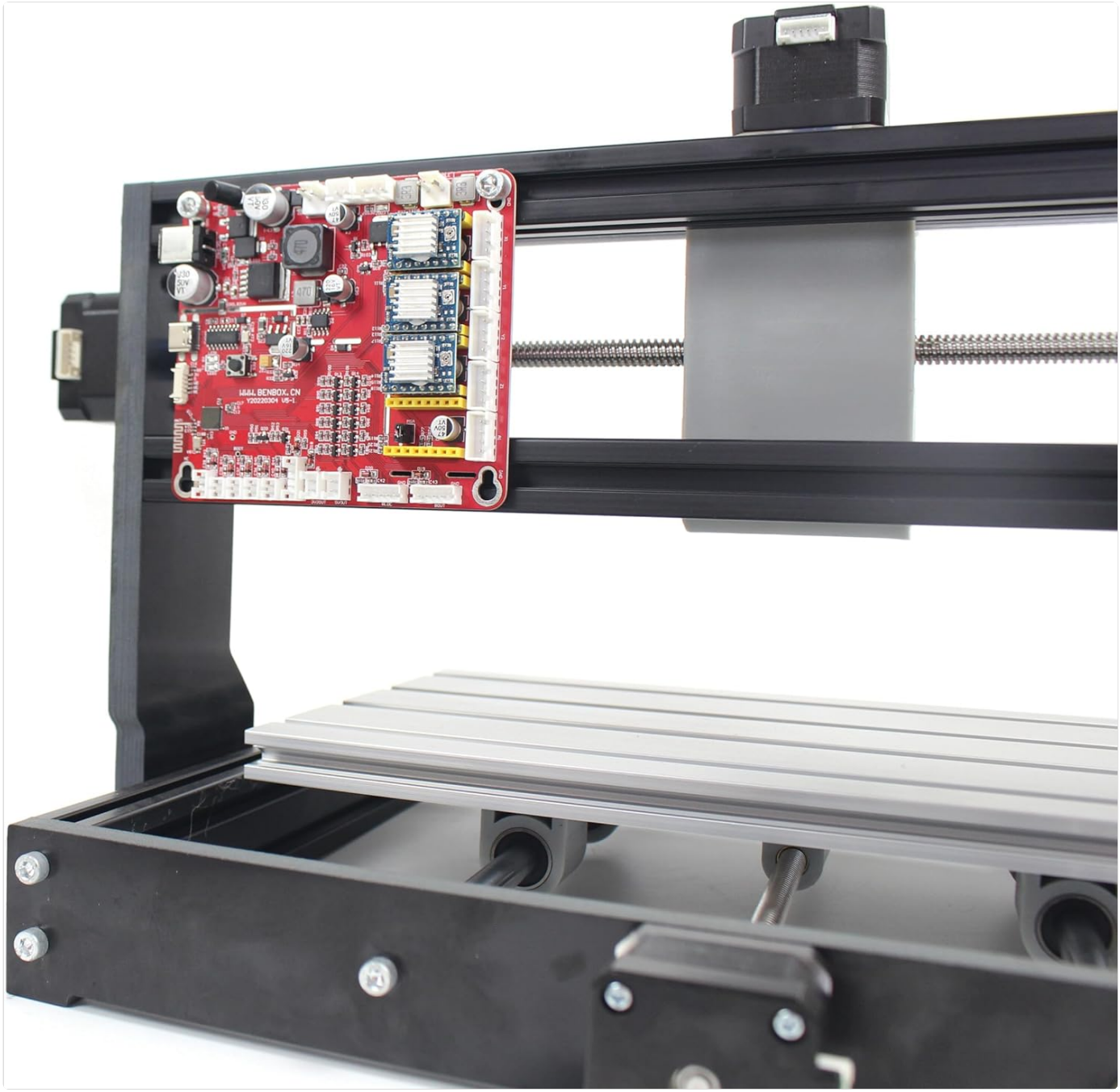


Figure 5.1: The RATTMMOTOR CNC Controller Board installed within a typical mini CNC machine frame, demonstrating how it integrates into the overall system.

6. Operating Instructions

6.1. Software Installation (GRBL Control)

The RATTMMOTOR CNC Controller Board uses GRBL firmware. You will need a GRBL-compatible control software on your computer (e.g., GRBL Control, Lite.fire, Universal Gcode Sender, Candle).

1. **Driver Installation:** When connecting the board via USB for the first time, your operating system may automatically install the necessary CH340 USB-to-Serial driver. If not, you may need to manually download and install it from the CH340 manufacturer's website or a reliable source.
2. **Software Download:** Download your preferred GRBL control software (e.g., Candle, Universal Gcode Sender) from its official website.
3. **Software Setup:** Follow the software's instructions to install and configure it. You will typically need to select the

correct COM port corresponding to your connected controller board.

6.2. Basic Operation Steps

1. **Power On:** After all connections are secure, turn on the power supply to the controller board using the integrated power switch button.
2. **Connect to Software:** Open your GRBL control software and establish a connection to the controller board via the correct COM port.
3. **Homing (Optional but Recommended):** If your machine has homing switches, perform a homing cycle to set the machine's absolute zero position.
4. **Set Workpiece Zero:** Manually or using a probe, set the workpiece zero point (G54 offset) in your software.
5. **Load G-code:** Load your desired G-code file into the control software.
6. **Start Job:** Initiate the engraving or routing job from the software. Monitor the machine closely during operation.
7. **Emergency Stop:** In case of any malfunction or emergency, immediately press the emergency stop button on your machine or disconnect power.

6.3. Using the 4th Axis (A-Axis)

The board supports 4-axis engraving. To utilize the A-axis, ensure your GRBL firmware is configured for 4 axes and your G-code includes A-axis commands. Connect your rotational axis stepper motor to the 'A' port on the board.

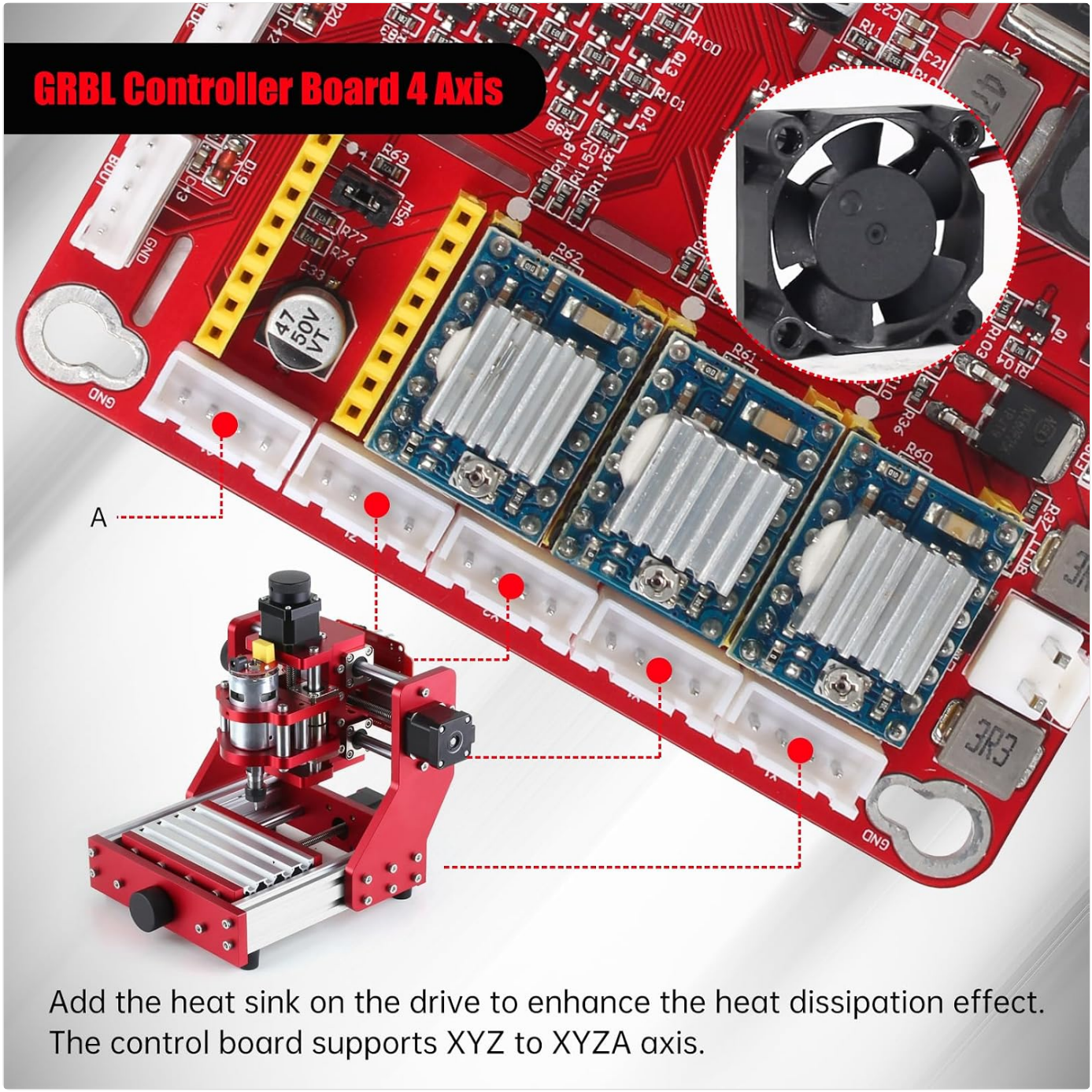


Figure 6.1: Close-up of the GRBL Controller Board highlighting the stepper motor drivers with heat sinks, indicating support for XYZ to XYZA axis control. This image also shows the connection points for the stepper motors.

7. Maintenance

- **Cleaning:** Regularly clean the board and its surroundings to prevent dust and debris buildup, which can affect performance and lead to overheating. Use a soft, dry brush or compressed air.
- **Connections:** Periodically check all wiring connections to ensure they are secure and free from corrosion. Loose connections can lead to erratic behavior or damage.
- **Heat Management:** Ensure adequate airflow around the board, especially around the stepper motor drivers. The board is equipped with a silent fan for cooling, but external factors can still affect heat dissipation.
- **Firmware Updates:** Check for official GRBL firmware updates periodically. While the board comes with GRBL 1.1f, newer versions might offer improvements or bug fixes. Follow official GRBL documentation for firmware flashing procedures.

8. Troubleshooting

Problem	Possible Cause	Solution
Board not recognized by computer	Missing or incorrect USB-CH340 driver; faulty USB cable; incorrect COM port selected.	Install the correct CH340 driver. Try a different USB cable or USB port. Verify the COM port in Device Manager and select it in your GRBL software.
Motors not moving or moving erratically	Incorrect motor wiring; insufficient power supply; stepper driver current too low/high; GRBL settings incorrect; loose connections.	Check motor wiring polarity. Ensure power supply meets voltage and current requirements. Adjust stepper driver current (if adjustable). Verify GRBL $ settings (e.g., steps/mm, max rate). Secure all connections.
Spindle/Laser not activating or weak	Incorrect wiring; GRBL PWM settings incorrect; faulty spindle/laser module.	Check spindle/laser wiring. Verify GRBL $30, $31, $32 settings for PWM and laser mode. Test spindle/laser with a known good power source if possible.
Limit switches not working	Incorrect wiring; GRBL limit switch settings ($21, $22) incorrect; faulty switch.	Ensure limit switches are wired correctly (normally open/closed). Check GRBL settings for limit switch enable and homing. Test switches manually.
Board overheating	Insufficient cooling; excessive motor current; prolonged high load.	Ensure the silent fan is operating. Verify stepper motor current is within recommended limits. Provide additional ventilation if necessary. Reduce load or operating time.

9. Warranty and Support

RATTMMOTOR products are designed for reliability and performance. For specific warranty details, please refer to the purchase documentation or contact your retailer. In most cases, a standard manufacturer's warranty covers defects in materials and workmanship under normal use.

Customer Support:

For technical assistance, troubleshooting beyond this manual, or warranty claims, please contact RATTMMOTOR customer support through the following channels:

- **Online Support:** Visit the official RATTMMOTOR website or their Amazon store page for FAQs and contact information. RATTMMOTOR Amazon Store
- **Email:** Refer to your product packaging or purchase invoice for direct email support.

When contacting support, please provide your product model (CNC 1310), purchase date, and a detailed description of the issue.

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